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EXAMINER				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/562,542

Applicant(s)

ZHOU ET AL.

Examiner

Jeff Piziali

Art Unit

2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/1/10, 11/9/09, 3/17/09, 8/6/08.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
4a) Of the above claim(s) 6 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-5 and 7 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 06 August 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB06)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ ~~Notice of Informal Patent Application~~
6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings were received on *6 August 2008*. These drawings are acceptable.

Election/Restrictions

3. Applicant's election with traverse of *Species I* in the reply filed on *1 March 2010* is acknowledged.

The traversal is on the ground(s): "*the examiner has not identified mutually exclusive characteristics of the species*" (see page 4 of the Election). Respectfully, this is not found persuasive.

As previously detailed on page 3 of the *1 February 2010* Restriction Requirement, the species are independent or distinct because of the following mutually exclusive characteristics:

Species I is drawn to a first voltage modulated transition matrix embodiment, using *high (i.e., not low) DC balancing voltage pulses* (e.g., see Fig. 4; Page 6, Line 30 - Page 7, Line 5 of the specification).

Species II is drawn to a second voltage modulated transition matrix embodiment, using no (i.e., not high or low) DC balancing voltage pulses (e.g., see Fig. 5a; Page 7, Lines 13-23 of the specification).

Species III is drawn to a third voltage modulated transition matrix embodiment, using low (i.e., not high) DC balancing voltage pulses, having no time period with zero voltage between driving pulses and the low DC balancing voltage pulses (e.g., see Figs. 5b, 5c, 6; Page 7, Line 24 - Page 8, Line 13 of the specification).

Species IV is drawn to a fourth voltage modulated transition matrix embodiment, using low (i.e., not high) DC balancing voltage pulses, having a time period with zero voltage between driving pulses and the low DC balancing voltage pulses (e.g., see Page 7, Lines 26-29 of the specification).

In addition, these species are not obvious variants of each other based on the current record.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reasons apply: the species or groupings of patentably indistinct species require a different field of search (e.g., searching different classes /subclasses or electronic resources, or employing different search strategies or search queries).

As demonstrated by the grounds of rejection in this Office action, at least one independent claim of the application does not avoid the prior art, therefore, the special technical feature of the application is anticipated by or obvious in view of the prior art.

The requirement is still deemed proper and is therefore made FINAL.

4. **Claim 6 is withdrawn** from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected species 3-4 (*wherein claim 6 recites the subject matter, "an inter-picture value below a switching threshold voltage" -- which is a mutually exclusive characteristic distinct and independent from elected species 1*), there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on *1 March 2010*.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

6. Claim 1 is objected to because of the following informalities:

Line 5 of the claim recites the subject matter: "***a first and second electrode (8,9).***"

However, it is respectfully noted that reference numerals 8 and 9 (*e.g., see Figure 2*) refer to "*substrates*" not "*electrodes*."

It would be unclear to one having ordinary skill in the art whether "*substrates*" or "*electrodes*" are intended to be claimed.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. *Claims 1-5 and 7* are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claim 1 recites the limitation "***the product of said picture value and picture duration***" (*line 10*). There is insufficient antecedent basis for this limitation in the claim.

10. Claim 1 recites the limitation "***the product of said inter-picture value and inter-picture duration***" (*line 15*). There is insufficient antecedent basis for this limitation in the claim.

11. Claim 1 recites the limitation "***a magnitude of said running total for a corresponding one of said picture elements (2) is reduced***" (*lines 22-23*). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art what the claimed "***magnitude of said running total for a corresponding one of said picture elements (2) is reduced***" relative to. "*Reduced*" compared to what?

12. The term "*said time interval is of the order of 0.5 seconds*" in claim 3 is a relative term which renders the claim indefinite.

The term "*is of the order of*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

It would be unclear to one having ordinary skill in the art what range or degree of precision the term "*is of the order of*" is intended to encompass. Does the term include or exclude the interval of "*0.5 seconds*"? Would $\pm 10\%$ of the "*interval*" be included within the limitation "*is of the order of*"? How about $\pm 50\%$? $\pm 90\%$? Does "*is of the order of 0.5 seconds*" include multiples of "*0.5 seconds*" (e.g., 0 s, 1 s, 1.5 s, 2 s, etc.)?

If the Applicant is of the position that the term "*is of the order of*" has a known meaning in the art, the Applicant is respectfully requested to provide it. Otherwise, a complete search and examination cannot be provided of the Applicant's intended invention.

13. The term "*substantially a maximum voltage available on the drive means*" in claim 5 is a relative term which renders the claim indefinite.

The term "*substantially a maximum*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

It would be unclear to one having ordinary skill in the art what range or degree of precision the term "*substantially a maximum*" is intended to encompass. Does the term include

or exclude the "*maximum*"? Would $\pm 10\%$ of the "*maximum*" be included within the limitation "*substantially a maximum*"? How about $\pm 50\%$? $\pm 90\%$?

If the Applicant is of the position that the term "*substantially a maximum*" has a known meaning in the art, the Applicant is respectfully requested to provide it. Otherwise, a complete search and examination cannot be provided of the Applicant's intended invention.

14. The remaining claims are rejected under 35 U.S.C. 112, second paragraph, as being dependent upon rejected base claims.

15. The claims are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

As a courtesy to the Applicant, the examiner has attempted to also make rejections over prior art -- based on the examiner's best guess interpretations of the invention that the Applicant is intending to claim.

However, the indefinite nature of the claimed subject matter naturally hinders the Office's ability to search and examine the application.

Any instantly distinguishing features and subject matter that the Applicant considers to be absent from the cited prior art is more than likely a result of the indefinite nature of the claims.

The Applicant is respectfully requested to correct the indefinite nature of the claims, which should going forward result in a more precise search and examination.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. *Claims 1, 5 and 7* are rejected under 35 U.S.C. 103(a) as being unpatentable over **Zehner et al (US 2003/0137521 A1)** in view of **Gates et al (US 6,531,997 B1)**.

Regarding claim 1, **Zehner** discloses a display apparatus [e.g., Fig. 1: 10] comprising:
an electrophoretic medium [e.g., Fig. 1: 26] comprising
charged particles in a fluid positioned in one of a plurality positions within said medium
[e.g., see Paragraph 2];
a plurality of picture elements [e.g., active matrix pixels];

a first and second electrode [e.g., *Fig. 1: pixel electrodes arranged in rows and columns, common electrode*] associated with each picture element for receiving a potential difference [e.g., *Fig. 1: via 18, 20*]; and

a drive means [e.g., *Fig. 1: 22, 24*] arranged to:

a) supply a sequence of picture potential differences [e.g., *two dimensional matrix of impulses or waveforms = positive and negative addressing signal pulses*] to each of said picture elements,

each of said picture potential differences having a picture value [e.g., *Fig. 6: pulse voltage level*] and an associated picture duration [e.g., *Fig. 6: pulse length*] (e.g., *see Paragraphs 87-106*),

the product of said picture value and picture duration representing a picture energy [e.g., *area given by $\pm V * t$ volt-seconds for a square wave*] for enabling the particles to occupy one of the positions for displaying a picture [e.g., *Fig. 3: 120*]; and

b) supply one or more inter-picture potential differences [e.g., *pre- and/or post-addressing signal pulses*] between at least two consecutive picture potential differences to selected ones of said picture elements,

said one or more inter-picture potential differences having an inter-picture value [e.g., *pulse voltage level*] and an associated inter-picture duration [e.g., *pulse duration*],

the product of said inter-picture value and inter-picture duration representing an inter-picture energy [e.g., *area given by $\pm V * t$ volt-seconds for a square wave*] which is insufficient to change the positions of the particles to cause an optical state change;

the apparatus further comprising

a memory means [e.g., Fig. 3: LUT 124, Register 128] for receiving and storing a data [e.g., Fig. 3: VI-Vn, D0:D5, POL] representative of the picture energy and the inter-picture energy of all of said potential differences applied to each picture element, and

providing a running total [e.g., *algebraic sum of the impulses*] of the picture energy and the inter-picture energy for each picture element,

the drive means being arranged to select the polarity [e.g., Figs. 3, 7: via POL] of said one or more inter-picture potential differences such that a magnitude of said running total for a corresponding one of said picture elements is reduced (*see the entire document, including Paragraphs 196-211*).

Should it be shown that **Zehner** discloses the subject matter of *supplying potentials to an electrophoretic medium*, as instantly claimed, with insufficient specificity:

Gates discloses a display apparatus comprising:

an electrophoretic medium [e.g., Fig. 1A] comprising
charged particles [e.g., Fig. 1A: 50] in a fluid [e.g., Fig. 1A: 25] positioned in one of a plurality positions [e.g., Figs. 1B, 1C] within said medium;

a plurality of picture elements [e.g., Fig. 4A: 200];

a first and second electrode [e.g., Fig. 1A: 30, 40] associated with each picture element for receiving a potential difference [e.g., Fig. 3D: $\pm V_0$]; and

a drive means (e.g., *see Column 31, Lines 2-10; Column 33, Lines 17-20*) arranged to:

a) supply a sequence of picture potential differences [e.g., Fig. 3D: *positive and negative addressing signal pulses 4*] to each of said picture elements,

each of said picture potential differences having a picture value [e.g., *Fig. 3D: $\pm V_0$*] and an associated picture duration [e.g., *Fig. 3D: $t_4 - t_3$*],

the product of said picture value and picture duration representing a picture energy [e.g., *Fig. 3D: area given by $\pm V * t$ volt-seconds for the square wave 4*] for enabling the particles to occupy one of the positions [e.g., *Fig. 3A: top position*] for displaying a picture [e.g., *Figs. 4A, 4B: "A" & "B"*]; and

b) supply one or more inter-picture potential differences [e.g., *Fig. 3D: positive and negative pre- and/or post- addressing signal pulses 2*] between at least two consecutive picture potential differences [e.g., *Fig. 3D: $\pm V_0$*] to selected ones of said picture elements,

said one or more inter-picture potential differences having an inter-picture value [e.g., *Fig. 3D: $\pm V_0$*] and an associated inter-picture duration [e.g., *Fig. 3D: $t_2 - t_1$*],

the product of said inter-picture value and inter-picture duration representing an inter-picture energy [e.g., *Fig. 3D: area given by $\pm V * t$ volt-seconds for the square wave 2*] which is insufficient to change the positions of the particles to cause an optical state change [e.g., *Fig. 3A to 3B: particles remain in the same position*];

the apparatus further comprising

a memory means [e.g., *Fig. 1A: wherein the electrophoretic capsule is bi-stable*] for receiving and storing a data [e.g., *grayscale levels*] representative of the picture energy and the inter-picture energy of all of said potential differences applied to each picture element, and

providing a running total [e.g., *remnant voltages*] of the picture energy and the inter-picture energy for each picture element,

the drive means being arranged to select the polarity of said one or more inter-picture potential differences such that a magnitude of said running total for a corresponding one of said picture elements is reduced [e.g., *DC balancing, via zero net time average signaling*] (*see the entire document, including Column 14, Line 10 - Column 24, Line 5*).

Zehner and **Gates** are analogous art, because they are from the shared inventive field of controlling electrophoretic displays via DC balancing.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine **Gates'** pre- and post-addressing DC balancing techniques with **Zehner's** display apparatus, so as to provide the functionality that **Zehner's** apparatus was designed to execute [e.g., *see Zehner: Paragraph 196, Line 2*], and so as to reduce the rate of display deterioration [e.g., *see Gates: Column 1, Lines 10-15*].

Regarding claim 5, **Gates** discloses the value of said inter-picture potential differences is substantially a maximum voltage [e.g., *Fig. 3D: $\pm V_0$*] available on the drive means (*see the entire document, including Column 17, Line 35 - Column 20, Line 52*).

Regarding claim 7, **Zehner** discloses a number [e.g., *memory means stores multiple impulses, stores the algebraic sum of the impulses*] and a polarity [e.g., *Fig. 3: via POL*] of said inter-picture potential differences are stored in the memory means (*see the entire document, including Paragraph 196*).

19. *Claims 2-4* are rejected under 35 U.S.C. 103(a) as being unpatentable over **Zehner et al (US 2003/0137521 A1)** and **Gates et al (US 6,531,997 B1)** as applied to *claim 1* above, and further in view of **Machida et al (US 2002/0196207 A1)**.

Regarding claim 2, **Gates** discloses a time interval [e.g., *Fig. 3D: frame addressing period t_d*] is provided between each inter-picture potential difference applied to a corresponding one of said plurality of picture elements (*see the entire document, including Column 17, Line 35 - Column 20, Line 52*).

Should it be shown that the combination of **Zehner** and **Gates** discloses the *timing*, as instantly claimed, with insufficient specificity:

Machida discloses a time interval [e.g., *Fig. 9: frame addressing period*] is provided between each inter-picture potential difference applied to a corresponding one of said plurality of picture elements (*see the entire document, including Figs. 1-3, 9, 23; Paragraphs 4, 17-21, 27, 31, 40, 85-99, 105, 192-195*).

Zehner, **Gates**, and **Machida** are analogous art, because they are from the shared inventive field of driving electrophoretic displays.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine **Machida's** timing techniques with **Zehner** and **Gates'** combined display apparatus, so as to drive the resultant display at a well known, common, and commonly understood timing/frequency.

Regarding claim 3, *Machida* discloses said time interval is of the order of 0.5 seconds (see the entire document, including Fig. 9; Paragraphs 103, 105, 144, 151, 153, 162, 169, 178, 201, 209).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine *Machida's* 0.5 second timing techniques with *Zehner and Gates'* combined display apparatus, so as to drive the resultant display at a well known, common, and commonly understood timing/frequency.

It would have been obvious to one of ordinary skill in the art at the time of invention because all the claimed elements were known in the prior art and one skilled in the art could have combined a *0.5 second time interval* as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Regarding claim 4, *Machida* discloses a electrophoretic display driving frequency ranging from 20Hz (*i.e.*, 50ms) to 20kHz (*i.e.*, 0.05ms), which includes the duration of each inter-picture potential difference being 2-8ms.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine *Machida's* 2-8ms pulse duration with *Zehner and Gates'* combined display apparatus, so as to drive the resultant display at a well known, common, and commonly understood timing/frequency.

It would have been obvious to one of ordinary skill in the art at the time of invention because all the claimed elements were known in the prior art and one skilled in the art could have

combined a 2-8ms pulse duration as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Response to Arguments

20. Applicant's arguments filed on 6 August 2008 have been fully considered but they are not persuasive.

The Applicant contends, "*With regard to the term 'substantially' in Figure 5, applicant submits that contrary to the assertion in the Office Action that the term is indefinite, MPEP 2173.05(b)D recites case law wherein the term 'substantially' is found to be a definitive term in the context of the specification and that the use of the term 'substantially' does not render a claim indefinite per se. In this case, one skilled in the art would understand that the term refers to 'approximately' the maximum voltage*" (see Page 9 of the Response filed on 6 August 2008). However, the examiner respectfully disagrees.

The examiner is not arguing that the term "*substantially*" is indefinite per se in all patent applications. However, the term "***substantially a maximum voltage***," as instantly claimed in the present application, is indeed both vague and indefinite.

It would be unclear to one having ordinary skill in the art what range or degree of precision the term "***substantially a maximum***" is intended to encompass. Does the term include

or exclude the "*maximum*"? Would $\pm 10\%$ of the "*maximum*" be included within the limitation "*substantially a maximum*"? How about $\pm 50\%$? $\pm 90\%$?

If the Applicant is of the opinion that the term "*substantially a maximum*" has a known meaning in the art, the Applicant is respectfully requested to provide it. Otherwise, a complete search and examination cannot be provided of the Applicant's intended invention.

Applicant's arguments with respect to *claims 1-5 and 7* have been considered but are moot in view of the new ground(s) of rejection.

By such reasoning, rejection of the claims is deemed necessary, proper, and thereby maintained at this time.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chanh Nguyen can be reached on (571) 272-7772. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeff Piziali/
Primary Examiner, Art Unit 2629
4 March 2010